

WHAT IS CLAIMED IS:

1 1. A stent delivery device for delivering a plurality of stent segments to a
2 treatment site, the device comprising:
3 a catheter shaft having a proximal end and a distal end;
4 an expandable member coupled with the catheter shaft near the distal end;
5 an axially movable sheath disposed over at least part of the catheter shaft and
6 the expandable member;
7 a shuttle disposed coaxially over at least part of the catheter shaft and the
8 expandable member, at least part of the shuttle being radially expandable; and
9 a plurality of stent segments disposed along the shuttle;
10 wherein moving the sheath axially toward the proximal end of the catheter
11 shaft allows at least part of the expandable member to expand against the shuttle to cause the
12 shuttle to radially expand, thus causing at least one of the plurality of stent segments to
13 expand.

1 2. A device as in claim 1, wherein the shuttle is slidably disposed over at
2 least part of the catheter shaft and the expandable member.

1 3. A device as in claim 1, wherein the shuttle is fixedly disposed over at
2 least part of the catheter shaft and the expandable member.

1 4. A device as in claim 1, wherein the shuttle is disposed over the sheath.

1 5. A device as in claim 1, wherein the sheath is disposed over the shuttle.

1 6. A device as in claim 1, wherein the sheath is adapted to expose a first
2 portion of the expandable member to deploy a first selected number of stent segments.

1 7. A device as in claim 6, wherein the sheath is adapted to further expose
2 at least a second portion of the expandable member to deploy a second selected number of
3 stent segments.

1 8. A device as in claim 1, wherein the stent segments are fixed to the
2 shuttle until they are expanded into a deployed position.

1 9. A device as in claim 1, wherein the stent segments are slidably
2 disposed along the shuttle, the device further comprising a stent pushing member disposed
3 over the shuttle, proximal to the plurality of stent segments, for advancing the stent segments
4 along the shuttle in a direction from proximal to distal.

1 10. A device as in claim 9, wherein the shuttle further comprises an
2 abutment at or near a distal end of the shuttle for preventing the plurality of stent segments
3 from being advanced beyond the distal end of the shuttle.

1 11. A stent delivery device for delivering a plurality of stent segments to a
2 treatment site, the device comprising:

3 a catheter shaft having a proximal end and a distal end;

4 an expandable member coupled with the catheter shaft near the distal end;

5 an axially movable sheath disposed over at least part of the catheter shaft and
6 the expandable member;

7 a shuttle disposed over at least part of the catheter shaft and the expandable
8 member, at least part of the shuttle being radially expandable;

9 a plurality of stent segments slidably disposed along the shuttle; and

10 a stent pushing member disposed over the shuttle, proximal to the plurality of
11 stent segments, for advancing the stent segments distally along the shuttle;

12 wherein moving the sheath axially toward the proximal end of the catheter
13 shaft exposes at least part of the expandable member, allowing it to expand against the shuttle
14 to cause the shuttle to radially expand, causing at least one of the plurality of stent segments
15 to expand.

1 12. A device as in claim 11, wherein the shuttle is slidably disposed over at
2 least part of the catheter shaft and the expandable member.

1 13. A device as in claim 11, wherein the shuttle is fixedly disposed over at
2 least part of the catheter shaft and the expandable member.

1 14. A device as in claim 11, wherein the shuttle is disposed over the
2 sheath.

1 15. A device as in claim 11, wherein the sheath is disposed over the
2 shuttle.

1 16. A device as in claim 11, wherein the sheath is adapted to expose a first
2 portion of the expandable member to deploy a first selected number of stent segments.

1 17. A device as in claim 16, wherein the sheath is adapted to further
2 expose at least a second portion of the expandable member to deploy a second selected
3 number of stent segments.

1 18. A device as in claim 11, wherein the shuttle further comprises an
2 abutment near a distal end of the shuttle for preventing the plurality of stent segments from
3 being advanced beyond the distal end of the shuttle.

1 19. A device as in claim 11, further including at least one valve member
2 coupled with the sheath for selectively retaining at least one stent segment within the sheath.

1 20. A device as in claim 11, wherein the stent pushing member is
2 configured to engage a proximal stent segment disposed at a proximal end of the plurality of
3 stent segments.

1 21. A method for delivering a plurality of stent segments to a treatment
2 site, the method comprising:
3 positioning a distal portion of a stent delivery catheter device at the treatment
4 site; and
5 moving a sheath of the catheter device proximally to expose at least part of an
6 expandable member on the catheter device, thus allowing the exposed expandable member to
7 expand against an expandable shuttle of the catheter device to deploy at least one of the
8 plurality of stent segments.

1 22. A method as in claim 21, wherein deploying the at least one stent
2 segment comprises deploying a first plurality of stent segments.

1 23. A method as in claim 22, wherein deploying the first plurality of stent
2 segments comprises:
3 selecting a number of stent segments desired to be deployed; and

4 moving the sheath to a position along the catheter device to deploy the
5 selected number of stent segments.

1 24. A method as in claim 22, further comprising moving the sheath farther
2 proximally to further expose the expandable member to allow it to expand against the
3 expandable shuttle to deploy a second plurality of stent segments.

1 25. A method as in claim 24, further comprising moving the sheath farther
2 proximally to further expose the expandable member to allow it to expand against the
3 expandable shuttle to deploy a third plurality of stent segments.

1 26. A method as in claim 21, further comprising moving the plurality of
2 stent segments in a distal direction along the shuttle, using a stent pushing member disposed
3 over the shuttle proximal to the stent segments.

1 27. A method for delivering a plurality of stents to a treatment site, the
2 method comprising:
3 positioning a distal portion of a stent delivery catheter device at the treatment
4 site; and
5 moving a sheath of the catheter device proximally to expose at least part of an
6 expandable member on the catheter device, thus allowing the exposed expandable member to
7 expand against an expandable shuttle of the catheter device to deploy at least a first stent of
8 the plurality of stents.

1 28. A method as in claim 27, wherein the first stent comprises a selected
2 number of stent segments.

1 29. A method as in claim 27, further comprising moving the sheath farther
2 proximally to further expose the expandable member to allow it to expand against the
3 expandable shuttle to deploy a second stent.

1 30. A method as in claim 29, wherein the first and second stents have
2 different lengths.

1 31. A method as in claim 29, wherein the first and second stents have
2 different shapes.

1 32. A method as in claim 29, wherein the first stent comprises a first
2 selected number of stent segments and the second stent comprises a second selected number
3 of stent segments.

1 33. A method as in claim 29, further comprising moving the sheath farther
2 proximally to further expose the expandable member to allow it to expand against the
3 expandable shuttle to deploy a third stent.

1 34. A method as in claim 33, further comprising moving the plurality of
2 stent segments in a distal direction along the shuttle, using a stent pushing member disposed
3 over the shuttle proximal to the stent segments.

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